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The Information Ecosystem

Information Ecology, emphasizes an organization's entire information environment. It addresses all of a firm's values and beliefs about information (culture); how people actually use the information and what they do with it (behavior and work processes); the pitfalls that can interfere with information sharing (politics); and what information systems are already in place (yes, finally, technology).

Thomas H. Davenport, ***Information Ecology: Mastering the Information and Knowledge Environment,*** *(1997)*

The Information Ecosystem within our cultural resources community includes all those individuals and professions that create, manage, use, and adaptively re-use information in all forms. In an effective information ecosystem, data (facts and observations), information (data with purpose and context), and knowledge (valuable information plus human understanding) are all managed holistically as valuable professional and organizational resources of interest to an ever-growing international community. At the end of the 20th century, cultural resource managers have become knowledge workers.[1]

In Richard Lanham's *Electronic Word* (1993)[2] he states that in a knowledge-based economy, the scarcest commodity is human attention, not information. In this model, human attention is labor, which gives information structure, usefulness, and value—in effect making it knowledge. Lanham views information technology as a means to the end of capturing the interest of students and scholars and other information users. Technology democratizes access to information, leading to expanding markets for both knowledge workers and knowledge consumers.

At the turn of the millennium, our Information Ecosystem is both more complex and more vulnerable to neglect than ever before. No one organization working alone can preserve our knowledge and make it accessible to the huge audiences desiring it. If we are to learn how to create information efficiently, manage it effectively, and preserve it sufficiently, we must work together as a series of allied professions to meet the new challenges ahead.

This special issue of *CRM* supplements the course "Information Ecosystem: Managing the Life Cycle of Information for Preservation and Access." The Information Ecosystem course was offered at the National Archives facility in College Park, Maryland, March 10-13th, 1998, by the National Park Service, the Northeast Document Conservation Center, and the National Archives and Records Administration (NARA). Both the Information Ecosystem course and this issue of *CRM* focus on an integrated approach to the management of cultural resource information that builds upon the knowledge and expertise of archivists, curators, information resource managers, librarians, and records managers. A linked issue of *CRM*, *"Archives at the Millennium,"* will appear in early 1999.

Who are the Key CRM Players?

Ultimately it is the cumulative effect of many individual's small daily activities that determines whether or not we capture and preserve the staff knowledge, organizational information, and data that make up our cultural resources legacy. In Cultural Resources Management (CRM), there are many key players in the information ecosystem. This issue of *CRM* includes articles from most of them, including the following:

- ***archeologists,*** who excavate prehistoric and historic sites and produce documentation during excavations. An article by Harrison Eiteljorg II, Director, Center for the Study of Architecture and the Archaeological Data Archive Project on page 21 of this issue talks about archeology and archives.
- ***architectural historians,*** who work with archival primary sources, such as sketches, blueprints, and notes, and library publications to determine the history and original structure of a building and the history of changes to a structure which are recorded in further notes and drawings. An article by Keeper of the National Register Carol Shull discusses the history of National Register technological changes on page 45.
- ***archivists,*** who arrange, identify, appraise, describe, preserve, and provide access to the personal and family papers, corporate record, and organizational record of groups for scholars, students, publishers, and the general

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The Challenges

- ***Tremendous growth in the size and nature of the national cultural resources record*** that we preserve and manage due to the increasing number of key organizations, people, and professions involved; growth in what cultural resources we protect; the increasing quantities of data collected by most organizations; the ease of information sharing among partners and cooperators in a digital world; and the increasing breadth of our cultural resource preservation, documentation, and outreach activities among partners and cooperators.
- ***Increasing demand for cultural resources information,*** including our own organization's appetite for 1) key summary information for management purposes such as the Government Performance Results Act (GPRA), 2) requirements to mount more data on our World Wide Web sites to meet the needs of the international community, and 3) the need to mount information on the Web to meet Freedom of Information Act requirements. Other insatiable audiences include scholars, publishers, vendors, online order fulfillment services, educators, school groups, colleagues, fellow professionals, and a growing community of "edutainment" producers of games, the History and Discovery Channels, and others.[1]
- ***Significant resource limitations*** which limit what cultural resources records we can preserve and make accessible and how (e.g., less conservation treatment, less detailed description). We are already masters of economies of scale; further improvements will shave very few cents off our budgetary dollar. Partnerships with outside for-profit organizations can help, but require time, cooperative agreements and memoranda of understanding, retraining, management policies, and sometimes special legislation.[2]
- ***Increasing costs of information management,*** including such factors as higher staff costs, preservation supplies costs, reformatting costs, and data migration and refreshment costs. Information may be more expensive to preserve in the 21st century than it has been in the 20th century. Figures from several major digital projects indicate that the cost of managing permanent digital files may be much greater (between 10 and 16 times greater—according to University of Maryland Professor Charles Lowry on the University of Pennsylvania Web site) than that of preserving and making accessible equivalent paper files. This is at least partially due to the need to maintain hardware and software and continuously migrate and refresh files.[3]
- ***Changes in professional standards, strategies, and techniques,*** which require major systems changes; data mapping or revision; and retraining of personnel including the need to learn metadata standards, the Encoded Archival Description standards, and similar professional expertise. In the past, the standards of one profession rarely impacted another; now, cross-fertilization is rife. For example: archivists need to learn how to preserve GIS data from data center staff; while most Cultural Resources staff need to learn how to produce more durable information formats from archivists and conservators.
- ***Challenges to standard archival and library access and use strategies and operating principles and key legislation,*** such as copyright, privacy and publicity legislation, and the concept of fair use, which determine what information we make accessible and how. The fair use of cultural resource materials on the Web is under attack by those who wish to support pay-for-view and similar services. Cultural, ethical, and moral challenges are being introduced by indigenous peoples who wish to preserve their privacy and maintain ownership of their cultural heritage information, including that information found in public archives, libraries, and museums.[4]
- ***The fragility of our electronic record,*** which requires that we migrate and refresh the data regularly; label it accurately and according to standards; prevent misuse; and manage, and upgrade the software and hardware as necessary in order to provide access over time.[5]
- ***Reorganizations of our cultural resource institutions,*** massive restructuring, downsizing, and retirements result in a loss of staff knowledge and institutional memory. The only effective ways to ward off a resulting institutional memory loss are long-term cross-training of staff, excellent records management, a functioning organizational archives, and effective oral and video history programs. Too often valuable files containing cultural resource management information are orphaned and inappropriately destroyed. This loss of the record results in a diminished institutional knowledge base, as well as a loss of sometimes-irreplaceable data. Staff depart, taking their knowledge with them.
- ***New, rapidly changing, and swiftly vanishing formats of information*** from new color photographic and laser printing processes and geographic information systems to the World Wide Web. The last two of which are revised so often that they frequently vanish before they can be permanently captured in a durable media for future use.[6]

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public. An article by supervisory Archivist of the San Francisco Maritime Museum Mary Jo Pugh on page 10 describes information-seeking behavior in organizations; while an article by Heard Museum Archivist Richard Pearce-Moses on page 29 describes how data, information, knowledge, and records are adaptively re-used in archives.

- ***curators,*** who study the archival and library source materials and original objects and their documentation and conduct research for publications, exhibitions, and other outreach activities. An article by curator Susan Kraft of Yellowstone National Park describes their National Archives affiliated archives at Yellowstone National Park on page 27.
- ***historians,*** who research individuals, groups, and themes via a combination of primary (archival manuscripts, photographs, electronic records, and motion picture footage, sound recordings, and videotapes), secondary (published monographs), and tertiary (textbooks, indices, reviews, and abstracts) sources in order to produce new documents and manuscripts. Archives are the key data used in the ever-changing narratives, debates, and discussions that are the products of historians. An article by NPS Bureau Historian Barry Mackintosh describing the value of archives to the NPS will appear in the upcoming issue of *CRM* on "*Archives at the Millennium*."
- ***conservators,*** who preserve, treat, and reformat archival materials. Articles by conservators Jessica Johnson (NPS) and Steve Puglia (NARA) will provide an overview of NPS conservation publications and describe standards for the creation of permanent and durable information in the upcoming issue of *CRM* on "*Archives at the Millennium*."
- ***information resource managers, geographic information system staff, programmers, and systems analysts,*** who capture and manage electronic data for current use. An article by National Register Computer Specialist John Byrne on page 39 discusses managing ever-changing information technology for cultural collections with a historical perspective.
- ***interpreters and educators,*** who search the historical record for lively and telling stories to illuminate the past, which may be further captured in videotapes, articles, books, or notes. An article by Kellee Blake of NARA on page 24 explains how to use NARA Regional resources for interpretation; while an article by educator Susan Veccia of the National Digital Library (NDL) Program of the Library of Congress on page 34 explains how their archival resources are shared with millions online.
- ***librarians,*** who provide reference services, and produce Web sites, library catalog records, and literature guides. NPS librarian Amalin Ferguson talks about the plans for the NPS Library Program on page 36; while Hugh O'Connor, Director of the American Association for Retired Persons Research Information Center, describes how to search the information ecosystem on the Web on page 7.
- ***records managers,*** who locate, describe, appraise, and ultimately determine the final disposition of the miles of paper that exist within our organizations. A piece by NPS Records Manager Betsy Chittenden on page 15 provides her insights on the status and future of records management at the NPS.
- ***tribal cultural managers,*** who research yesterday's activities in archives and libraries and record today's activities for placement in cultural centers for tomorrow's children. An article by Archivist Donna Longo DiMichele of the Nashantucket Pequot Tribe in the linked *CRM* issue on *"Archives at the Millennium"* describes an active tribal archival program; while a piece by Michael Brown, the James N. Lambert Professor of Anthropology and Latin American Studies at Williams College, describes the challenges to fair use of cultural materials taking place in archives internationally on page 18.

This issue of *CRM* pays tribute to the many professions that create and manage the information ecosystem that ultimately ends up in archives. For many of us, our discoveries, research, and records linger in our offices until we move on to another position, take on a different series of projects, or simply decide to clean up our offices and dispose of the files. We are often so closely tied to these records that it is hard to remember that this data forms an invaluable part of the informational legacy of our organization.

Without the data and information in the records that we have created, our organization's information base is impoverished and its ability to effectively manage our cultural resources over time is diminished. Each of us can either manage our information effectively, bequeathing to our professional heirs a rich legacy of data and information, or treat it as our personal disposable belonging. When we treat our informational legacy as a personal belonging we are ensuring that our contributions, knowledge, information, and data will be lost to those who come after us. Professional ethics, our interest in having our contributions remembered, and Federal Records Laws, all

demand that we responsibly manage our informational legacy for future scholars, educators, students, and the public.

In Summary

At the end of the 20th century the Cultural Resource Information Ecosystem is imperiled by increasing costs, decreased budgets, fewer staff, more users, burgeoning information, increasingly unstable information formats, changing professional information standards and practices, revised laws on fair use and copyright, and institutional restructuring and instability. Simple neglect alone is enough to ensure disaster.

No organization or profession working alone can preserve our knowledge, ensure the survival of our information and make it accessible to the insatiable audiences who demand it. We must work together as allied professions and organizations to share our expertise and resources if we are to ensure the survival of our data, information, and knowledge for future generations. This legacy, which safely stores our factual observations for future theorists and managers, our information for later adaptive re-use, and our professional knowledge for enhancement of our organizations and professions, is our greatest gift to the future.

With this knowledge intact our professions and organizations are empowered to move into the future with confidence and integrity. Without our informational legacy, our organizations lack vision, and a sense of confidence informed by history and experience. If our hard-won data and information is to survive for future re-use, we must individually and as professional allies care for our information legacy on a daily basis using the techniques and practices described in this *CRM* issue on the "*Information Ecosystem*" and in the upcoming "*Archives at the Millennium*" issue.

Tower Falls at Yellowstone. Photo by William Henry Jackson.

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